

# MLB-G1101 Wireless Terminal

## User Manual



MLiS Basic Wireless Terminal 2G / 3G

Model Number:

MLB-G1101

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### Revision History

Version	Date	Description
1.0	Mar 2014	1 <sup>st</sup> Release
1.1	April 2014	2 <sup>nd</sup> Release
1.2	May 2015	3 <sup>rd</sup> Release
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# **1 INTRODUCTION**

## **1.1 Description**

The MLiS MLB-G1101 is a Dual Band 2G/3G wireless terminal designed for RS232/RS422/RS485 communication over TCP/IP via any readily available 2G/3G carrier network. Overall, it is more cost and time effective to use remote solutions to combine Machine to Machine over diverse locations without having first to establish and invest in a huge complex network.

The MLB-G1101 wireless terminal uses the DB9 Connector to provide data communication interface and the DC jack to provide power input. LEDs are used to indicate the status of the wireless terminal.

The MLB-G1101 wireless terminal can be used to provide a wireless communication link to many applications, including metering, fleet and asset management, vending, security and alarm monitoring, e-maintenance and other telemetry applications.

## **1.2 Highlights**

### **Interface**

- DC jack Connector for power
- DB9 connector(Female)
- SMA Female Connector (GSM antenna connector)
- SIM card reader
- 1 \* relay
- 2 \* I/O pins

### **General Features**

- Frequency Range : EU GSM/GPRS/EDGE: 900/1800MHz&UMTS/HSPA+: 900/2100MHz  
US GSM/GPRS/EDGE: 850/1900MHz&UMTS/HSPA+: 850/1900MHz
- Protocol Stack : TCP/UDP
- Power Supply Input : 5 to 32 VDC
- Relative Humidity : 90% MAX.
- Operation Temperature : -40°C ~75°C
- Switch Off Protection : +90°C
- Dimensions (L) x (W) x (H) : 119.5 x 89 x 26.9 mm (excluding connectors)
- Weight : 200g
- Casing Material : Metal

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## Data Transmission

- GPRS : Multi-slot Class 12, Mobile Station Class B.
- EDGE : Multi-slot Class 12
- CSD : -9.6kbps, non-transparent, V.110
- SMS : MT, MO, Cell Broadcast, Text and PDU mode.
- Serial Parameter :
  - Data Bits : 5, 6, 7, 8
  - Stop Bits : 1, 1, 5, 2
  - Parity : None, Even, Odd, Space, Mark
  - Flow Control : RTS/CTS, DTR/DSR
  - Baud-rate : 1200~230400 selectable
  - Serial signals : TxD, RxD, RTS, CTS, DTR, DSR, DCD, RST(reset circuit), GND
- Relay : 1 output with current carrying capacity of 1A @ 24 VDC
- Digital Inputs : 2 electrically isolated inputs:
  - +13 to 30V for state “1” (On)
  - +3 to -30V for state “0” (Off)
- ESD Protection : 15KV
- Data Buffering : 1M`
- Data Delimiter : Yes
- Data Length Packing : Yes
- M CCP/MCCU : Yes
  - API : M LiS Cellular Control Protocol (=M CCP)
  - Utility : M LiS Cellular Control Utility (=MCCU)

### 1.3 Functional Block diagram

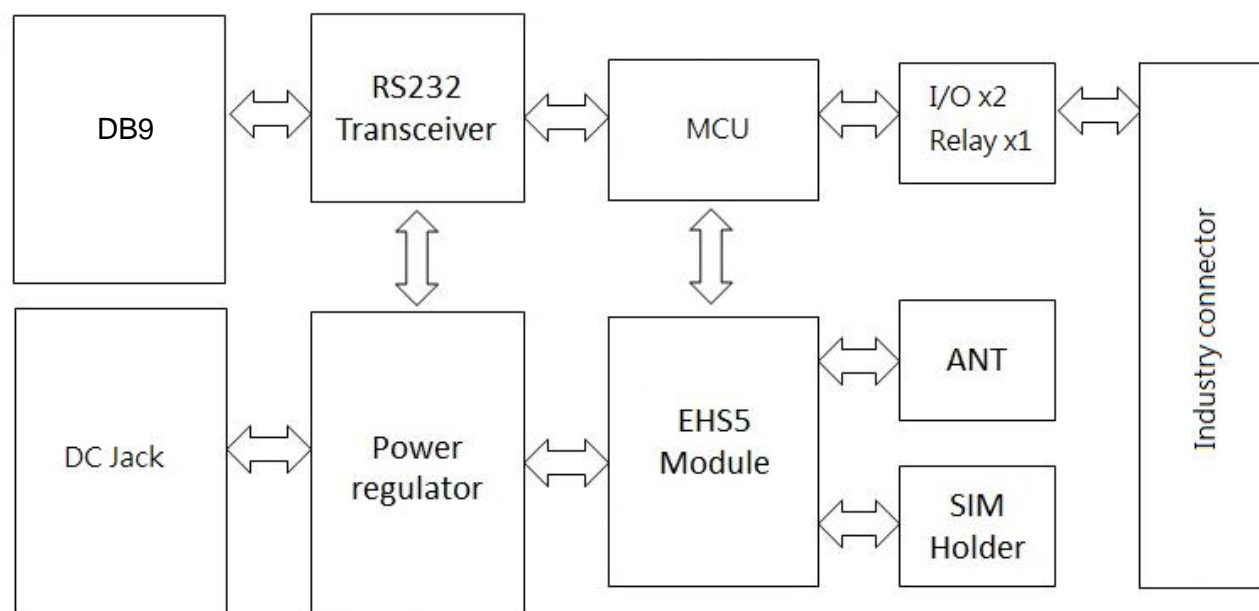


Figure 1: Functional Block Diagram for MLB-G1101

The MLB-G1101 consists of a fully certified (CE /NCC approved) GSM/GPRS engine, SIM card holder and power regulator.

The wireless terminal is supplied with power via the DC jack. The remaining DB9 connector is used for data communications.

The SMA female connector provides the air interface to an external 50 ohm antenna specified for the correct frequency band.



## 1.4 Main Features and Services

The MLB-G1101 performs a set of telecom services (TS) according to GSM standard phase 2+, ETSI and ITU-T. The services and functions of the MLB-G1101 are implemented by issuing customized applications embedded on the device, or by AT commands issued internally, or over the RJ45 to RS232 serial interface.

### 1.4.1 Operating Modes

The table below briefly summarizes the various operating modes referred to in the following chapters.


Normal operation	GSM / GPRS SLEEP	Various power save modes set with AT+CFUN command. Software is active to minimum extent. If the module was registered to the GSM network in IDLE mode, it is registered and paging with the BTS in SLEEP mode, too. Power saving can be chosen at different levels: The NON-CYCLIC SLEEP mode (AT+CFUN=0) disables the AT interface. The CYCLIC SLEEP modes AT+CFUN=7 and 9 alternately activate and deactivate the AT interfaces to allow permanent access to all AT commands.
	GSM IDLE	Software is active. Once registered to the GSM network, paging with BTS is carried out. The module is ready to send and receive.
	GPRS IDLE	Module is ready for GPRS data transfer, but no data is currently sent or received. Power consumption depends on network settings and GPRS configuration (e.g. multi-slot settings).
	GPRS DATA	GPRS data transfer in progress. Power consumption depends on network settings (e.g. power control level), uplink / downlink data rates, GPRS configuration (e.g. used multi-slot settings) and reduction of maximum output power.
POWER DOWN	Normal shutdown after sending the AT^SMSO command. Only a voltage regulator is active for powering the RTC. Software is not active. Interfaces are not accessible. Operating voltage (connected to BATT+) remains applied.	
Airplane mode	Airplane mode shuts down the radio part of the module, causes the module to log off from the GSM/GPRS network and disables all AT commands whose execution requires a radio connection. Airplane mode can be controlled by using the AT commands AT^SCFG and AT+CALA: <ul style="list-style-type: none"> <li>• With AT^SCFG=MEopMode/Airplane/OnStart the module can be configured to enter the Airplane mode each time when switched on or reset.</li> <li>• The parameter AT^SCFG=MEopMode/Airplane can be used to switch back and forth between Normal mode and Airplane mode any time during operation.</li> <li>• Setting an alarm time with AT+CALA followed by AT^SMSO wakes the module up into Airplane mode at the scheduled time.</li> </ul>	

Table 1: Operating Modes

## 1.4.2 Wireless Terminal Features and Electrical Specifications

Table 2: Features and Specifications

S/N	Feature	Specifications
1	Frequency Bands	EU GSM/GPRS/EDGE: 900/1800MHz and UMTS/HSPA+: 900/2100MHz  US GSM/GPRS/EDGE: 850/1900MHz and UMTS/HSPA+: 850/1900MHz
2	RF Output Power	Class 4 (+33dBm $\pm$ 2dB) for EGSM850 (quad band only) Class 4 (+33dBm $\pm$ 2dB) for EGSM900 Class 1 (+30dBm $\pm$ 2dB) for GSM1800 Class 1 (+30dBm $\pm$ 2dB) for GSM1900 (quad band only)
3	GSM Phase	Release 99
4	Power Supply	5 o 32 VDC
5	Power Consumption	- DATA mode : GPRS 1TX, 4RX GSM 850/EGSM 900 GSM 1800/1900 180mA 145mA
		- DATA mode : GPRS 2TX, 3RX GSM 850/EGSM 900 GSM 1800/1900 330mA 260mA
6	Operating Temperature	Normal operation: -40°C to +75°C
7	Data Transfer	GPRS Multi-slot Class 12 max 85.6kbps (Downlink and Uplink) Full PBCCH Support Mobile Station Class B Coding Scheme 1~4 PPP stack
		CSD V.110, RLP, non-transparent @2.4, 4.8, 9.6 & 14.4kbps USSD
		PPP-stack for GPRS data transfer
8	SMS	Point-to-Point MT and MO Cell Broadcast Text and PDU Mode Storage: SIM Card plus 25 SMS locations in mobile equipment Transmission of SMS alternatively over CSD or GPRS. Preferred mode can be user defined.
9	AT Commands	AT-Hayes 3GPP TS 27.007, TS 27.005
10	TCP/IP Stack	Access by AT Commands Internet Services include TCP, UDP,
11	Serial Interface	DB9 connector 8-wire Modem Interface with status and control lines, unbalanced, asynchronous Fixed bit rate: 1,200bps to 230,400bps Flow Control: Hardware RTS0/CTS0 and Software XON/OFF Multiplex ability according to GSM 07.10 Multiplexer Protocol
12	SIM Interface	SIM Card Slot

S/N	Feature	Specifications
		Supports SIM Cards: +3V and +1.8V
13	Antenna	50 ohms via External SMA Connector
14	Software Reset	Orderly shutdown and Reset by AT Command (AT^SMSO)
15	 RoHS	All hardware components are fully compliant with the EU RoHs directive 2002/95/EC Exception: MLB55IN

## 1.5 Precautions

The MLB-G1101 wireless terminal is designed for indoor use only. For outdoor use it has to be integrated into a weatherproof enclosure. Do not exceed the environmental and electrical limits as specified in the user manual.

## 2 MECHANICAL DESCRIPTION

### 2.1 Overview

The pictures below show the mechanical design of the wireless terminal along with the positions of the different connectors.

### 2.2 Dimensions

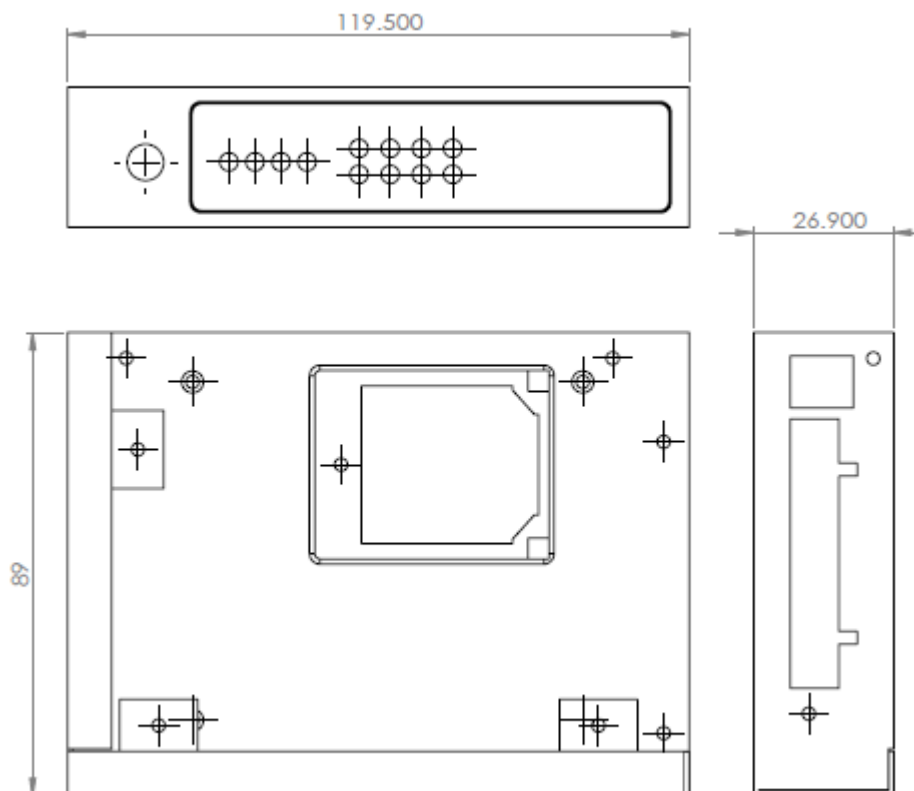


Figure 2: Chassis Dimension for MLB-G1101

S/N	Parameter	Value
1	Height (H)	26.9mm
2	Length (L)	119.5mm
3	Width (W)	89.0mm
4	Weight	200g
5	Chassis Material	Metal

Table 3: Chassis Dimensions and Mechanical Description for MLB-G1101

### 3 ELECTRICAL INTERFACE DESCRIPTIONS

#### 3.1 Right side view (DB9 connector)

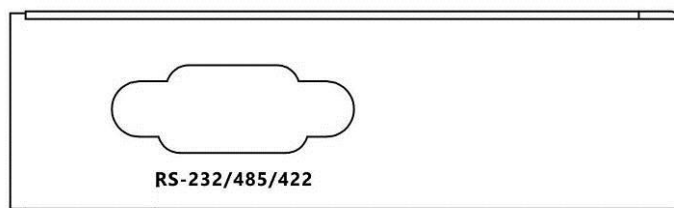


Figure 3:RS232/RS422/RS485 for MLB-G1101

The table below defines the RS232/RS422/RS485 pin configuration on the wireless terminal

#### Pinouts

Pin	RS-232	RS-422/485 4-wire	RS-485 2-Wire
1	DCD = Input	Not Used	Not Used
2	RXD = Input	RXD+ = Input	Not Used
3	TXD = Output	TXD+ = Output	DAT+ (often B)
4	DTR = Output	Not Used	Not Used
5	GND	GND	GND
6	DSR = Input	RXD-- = Input	Not Used
7	RTS = Output	Not Used	Not Used
8	CTS = Input	Not Used	Not Used
9	Not Used	TXD-- = Output	DAT-- (often A)

Table 4: DB9 pins define for MLB-G1101

### 3.2 Left side view (DC Jack & Industry connector)



Figure 4: DC and Industry connector for MLB-G1101

The interfaces and indicators for MLB-G1101 are as follows:

Name	Description	Function
DC	DC	Input Power:+5V~+32V
Terminal Block	PWR(V+,V-)	<ul style="list-style-type: none"> <li>Input Power:+5V~+32V</li> <li>Pin #1 is V+</li> <li>Pin #2 is V-</li> <li>When use DC for input, the output power of TB is same as input power</li> <li>➤ <b>Do Not</b> use DC &amp; PWR to be the input power at the same time, it may cause damage to the equipment.</li> </ul>
	Relay	External Relay:max+40V
	DI1(I1,COM_1) Pin #5 is + Pin #6 is -	<ul style="list-style-type: none"> <li>I1:external signal +12V~+48V</li> <li>COM_1:common grand</li> <li>Pin #5 is +</li> <li>Pin #6 is -</li> </ul>
	DI2(I2,COM_2) Pin #7 is + Pin #8 is -	<ul style="list-style-type: none"> <li>I2:external signal,+12V~+48V</li> <li>COM_2:comman grand</li> <li>Pin #7 is +</li> <li>Pin #8 is -</li> </ul>
Reset	Reset	<ul style="list-style-type: none"> <li>1-click to reboot G1101.</li> <li>Double click to set G1101 into configuration mode.</li> <li>Long press over 5 seconds to reset G1101 to default.</li> </ul>

Table 5: Interfaces and Indicators Description of MLB-G1101

### 3.3 Frond view (Antenna & LED)

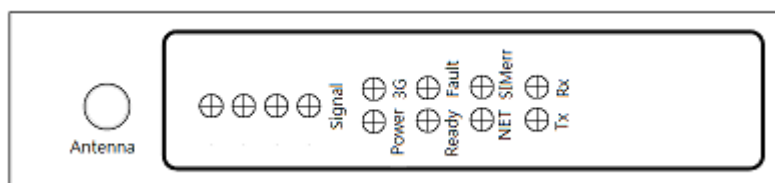


Figure 5: Antenna Connector for MLB-G1101

For optimum RF performance, the MLiS wireless terminal has to be connected to an external RF antenna matched to 50ohms. Please use a SMA Male connection for the wireless terminal.

The functions of LED are indicated on the table below.

Item	Description	Function
1	Power	Power on indication
2	3G	3G status indication
3	Ready	Function working indication
4	Fault	Occur error
5	Net	Builds connection
6	SIMerr	SIM card error indication
7	Tx	UART transmit indication
8	Rx	UART Receive indication

Table 6: LED functions of MLB-G1101

### 3.4 SIM card holder

In the bottom, The MLB-G1101 wireless terminal is provided with a SIM card reader designed for 1.8V and 3V SIM cards. It is the flip-up type which can be locked. It can be accessed through removing the battery cover as shown below.

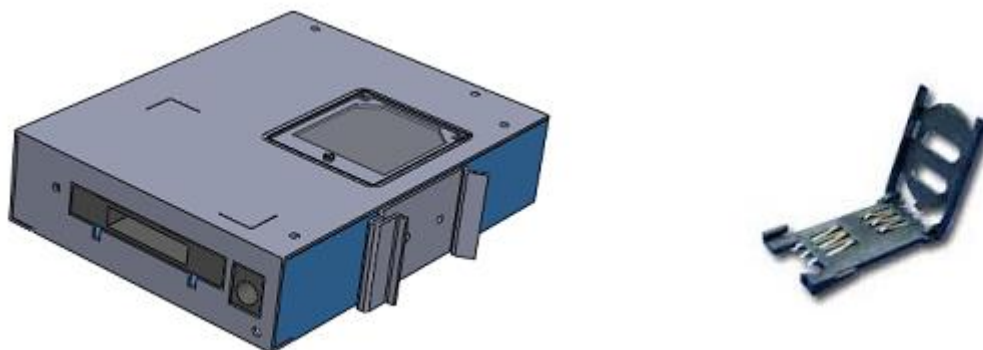


Figure 6: SIM Card Holder for MLB-G1101

- **Be sure to power off the modem when user replaces the SIM card. Otherwise it may cause damage to the equipment.**

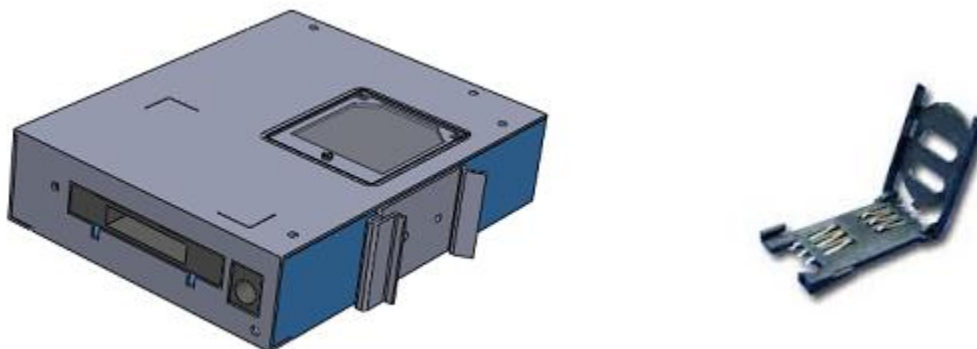
The MLB-G1101 fully operates when inserting a SIM card. Some MLB-G1101 functionality may be lost if user try to operate the wireless terminal without a SIM card.



### 3.5 Getting Started

#### HW installation

**Step 1:** Please insert SIM card into SIM card holder as follows



- **Be sure to power off the modem when user replaces the SIM card. Otherwise it may cause damage to the equipment.**

**Step 2:** Please connect serial port to device as following Pinouts

#### Pinouts

Pin	RS-232	RS-422/485 4-wire	RS-485 2-Wire
1	DCD = Input	Not Used	Not Used
2	RXD = Input	RXD+ = Input	Not Used
3	TXD = Output	TXD+ = Output	DAT+ (often B)
4	DTR = Output	Not Used	Not Used
5	GND	GND	GND
6	DSR = Input	RXD-- = Input	Not Used
7	RTS = Output	Not Used	Not Used
8	CTS = Input	Not Used	Not Used
9	Not Used	TXD-- = Output	DAT-- (often A)

**Step 3:** Please connect power supplier with 5~32 VDC, then boot up. The LED will light up when G1101 ready.

**Step 4:** After plug-in power adapter. The wireless terminal is usually fully operational within 30 seconds, after powering it up. Depending on the signal strength of the network in the area, logging into a network may take longer and is outside the control of the wireless terminal.

The device is ready after LED of signal is lighted. Then user can operate it.

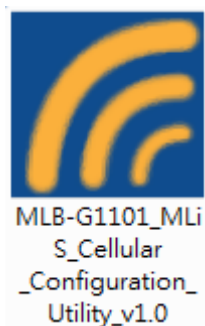
**Step 5:** When user use the MCCU (MLiS Cellular Configuration Utility) to configure MLB-G1101, please refer the connection as below:



## SW Installation

Preliminary work: Power on G1101 and use USB-to-RS232 cable to connect to G1101 & PC.

**Step 1:** Open MCCU (MLiS Cellular Configuration Utility)



**Step 2:** The main window of MCCU launch.

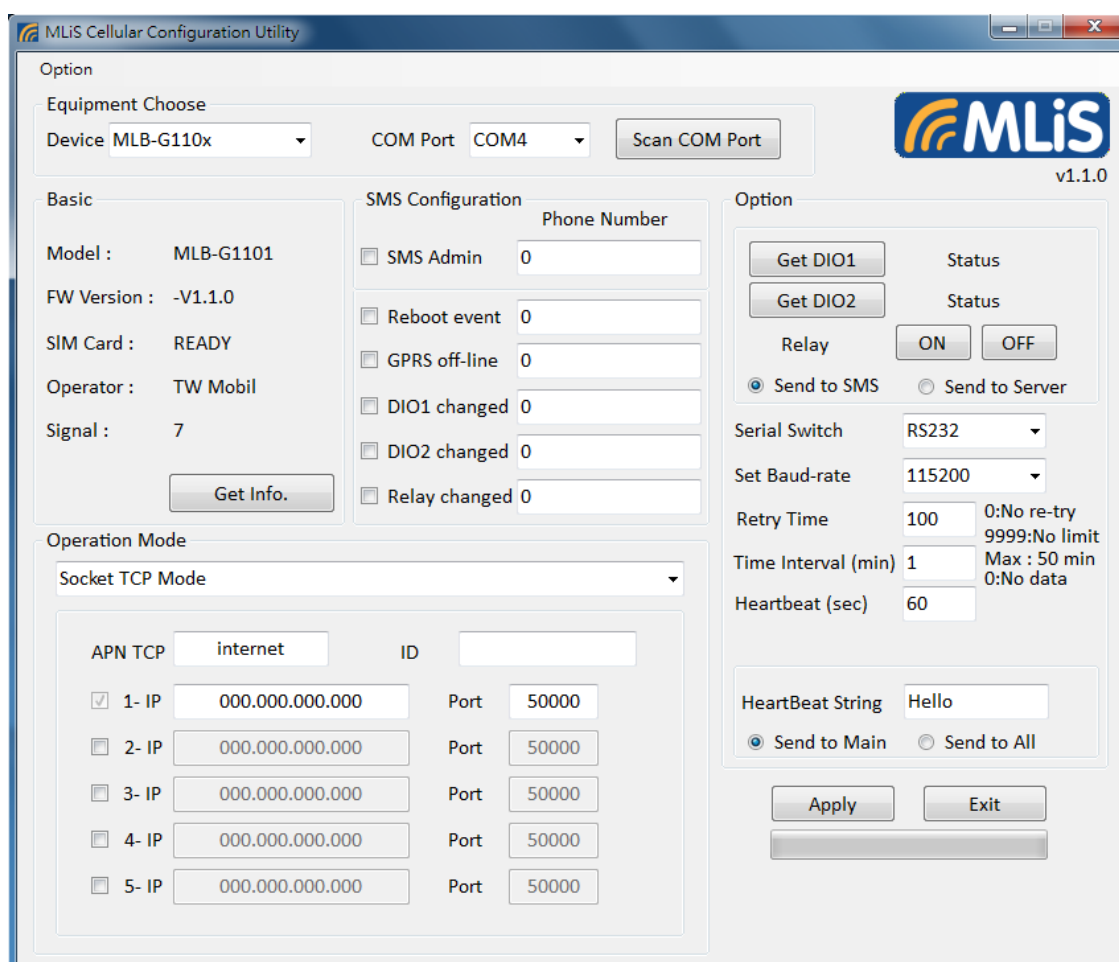

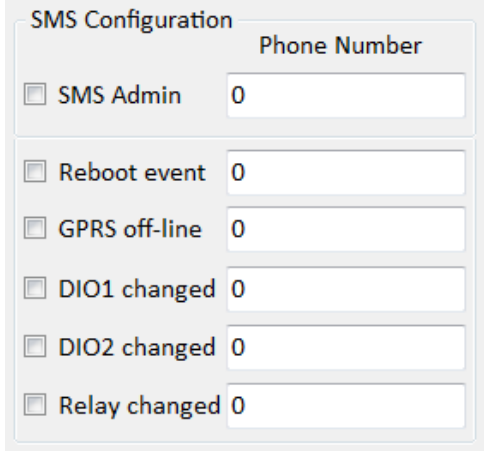
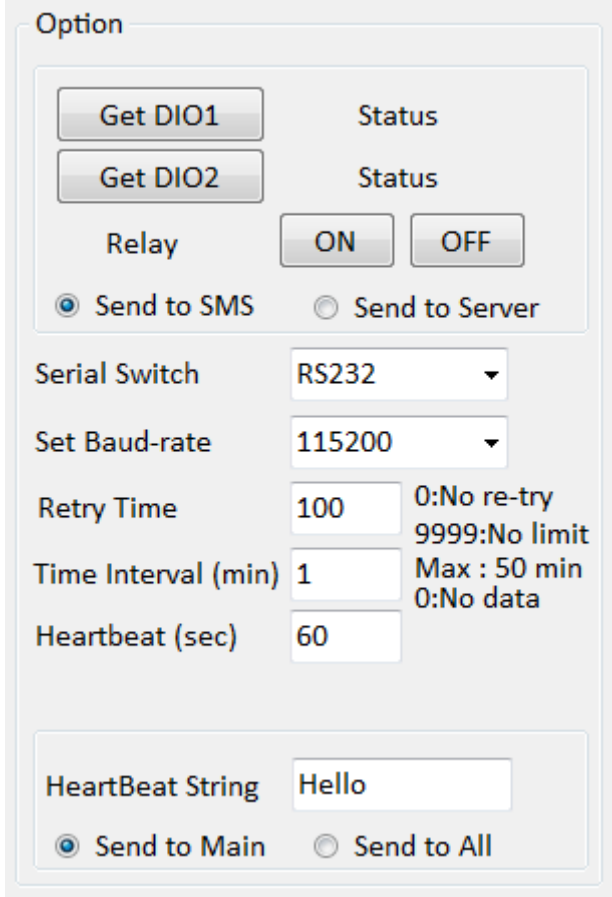


Figure 1: MLB-G1101 wireless terminal test tool

Basic Information	
The Basic Information page summarizes the current settings of MLB-G1101.	
Item	
Model	Shows the model user connected.
FW Version	Current firmware version.
SIM Card	The status of SIM Card.
Operator	Telecoms
Get Info	Click it to reload the basic info.

SMS Configuration		
MLB-G1101 support events alert through SMS.		
Item		Phone no. format
SMS Admin	Set the phone no. to be the Admin. Then user uses this phone to send SMS to modify the settings of MLB-G1101.	Input phone no. with country code. For example: +886911222333
	How to Send? (1). RESET (2). Change IP & Port.	1. RESET 2. TCPIPPORT+(space)+Profile Index (0 ~ 4)+ , + IP:Port+ , Ex 1 : TCPIPPORT 1, 192.168.1.1:3000, (TCP socket, Profile index = 1, IP = 192.168.1.1:3000) Ex 2 : TRANIPPORT 0, 192.168.2.2:6000, (Transparent mode, Profile index = 0, IP = 192.168.2.2:6000) Ex 3 : UDPIPPORT 4, 192.168.3.3:20000, (UDP mode, Profile index = 4, IP = 192.168.3.3:2000)
Reboot event	Tick the check box then input the phone number. When the reboot event occurred, G1101 will send SMS to the phone number user set.	Input phone no. with country code For example: +886911222333.
GPRS off-line	Tick the check box then input the phone number. When the GPRS off-line event occurred, G1101 will send SMS to the phone number user set.	Input phone no. with country code. For example: +886911222333.

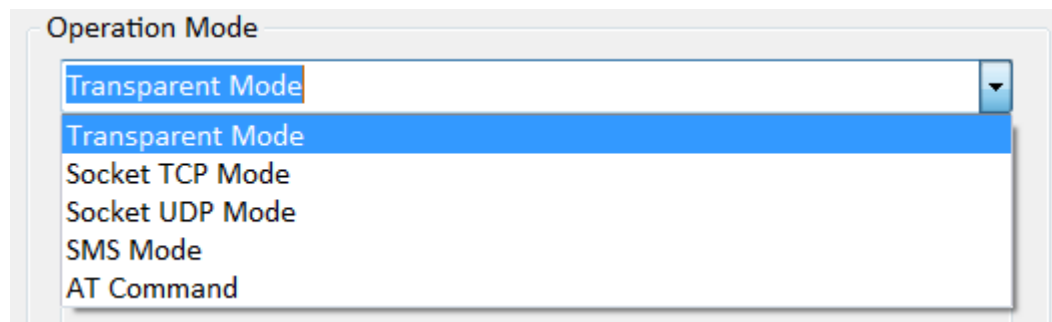
DIO1 changed	Tick the check box then input the phone number. When the DIO1 event occurred, G1101 will send SMS to the phone number user set.	Input phone no. with country code.  For example: +886911222333.
DIO2 changed	Tick the check box then input the phone number. When the DIO2 event occurred, G1101 will send SMS to the phone number user set.	Input phone no. with country code.  For example: +886911222333.
Relay changed	Tick the check box then input the phone number. When the relay event occurred, G1101 will send SMS to the phone number user set.	Input phone no. with country code.  For example: +886911222333.

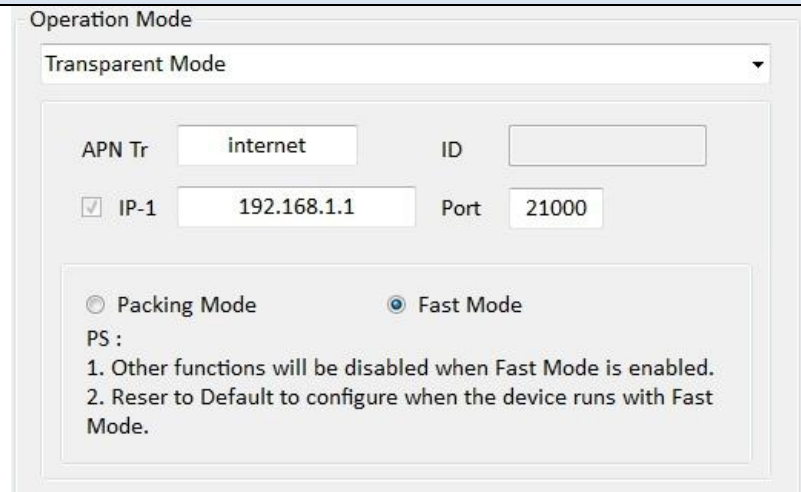
Option	
Set variables and Get Relay/DIO status in Option page.	
Item	
Get DIO1	Click to get the status of DIO1
Get DIO2	Click to get the status of DIO2
Relay	Click ON/OFF to enable/disable relay
Send to SMS/Send to Server	Select the receiver (SMS or Server) when the status of DIO changed.
Serial Switch	Select RS232/422/485 mode by drop-down list.
Set Baud-rate	Set different baud-rate by drop-down list.
Retry Time	Set the retry times when connection interrupts.
Time Interval	The interval between two retries.

Heartbeat	Set the transmission frequency of heartbeat. Ex. If user sets 60 seconds, the heartbeat will send every 60 seconds.
Heartbeat String	Set the string of heartbeat.
Send to Main/Send to all	Select the Heartbeat receiver. (Main server only or all)



**Step 3:** Select the Operation mode by drop-down list, then the related setting page displayed.



Operation mode	
Transparent Mode	
	<p>APN: Please confirm with carriers.</p> <p>ID: Set ID.(It supports up to 15 characters)</p> <p>IP-1: Single IP.</p> <p>Port: Set the port.</p> <p>Packing Mode/Fast Mode: Select the Mode under Transparent. Those modes are used for different cases. Please refer <b>Modes</b> table.</p> <p><b>Notice:</b> Other functions will be disabled when Fast Mode is enabled. Reset to default to configure when the wireless terminal runs with Fast Mode.</p>

<p>Socket TCP Mode</p>	<div data-bbox="456 197 1273 726"> <p>Operation mode</p> <p>Socket TCP Mode</p> <p>APN TCP internet ID</p> <p><input checked="" type="checkbox"/> 1- IP 192.168.1.1 Port 6000</p> <p><input type="checkbox"/> 2- IP 192.168.1.1 Port 6001</p> <p><input type="checkbox"/> 3- IP 192.168.1.1 Port 6002</p> <p><input type="checkbox"/> 4- IP 192.168.1.1 Port 6003</p> <p><input type="checkbox"/> 5- IP 192.168.1.1 Port 6004</p> </div> <p>APN: Please confirm with carriers.</p> <p>ID: Set ID.(It supports up to 15 characters)</p> <p>1-IP~5-IP: Multiple IP.</p> <p>Port: Set the port.</p> <p><b>Notice:</b> When the multiple IP function is enabled with large data transmission, the transmission performance will be affected.</p>
<p>Socket UDP Mode</p>	<div data-bbox="456 1136 1479 1776"> <p>Operation mode</p> <p>Socket UDP Mode</p> <p>APN UDP internet ID</p> <p><input checked="" type="checkbox"/> 1- IP 192.168.1.1 Port 6000</p> <p><input type="checkbox"/> 2- IP 192.168.1.1 Port 6001</p> <p><input type="checkbox"/> 3- IP 192.168.1.1 Port 6002</p> <p><input type="checkbox"/> 4- IP 192.168.1.1 Port 6003</p> <p><input type="checkbox"/> 5- IP 192.168.1.1 Port 6004</p> </div> <p>APN: Please confirm with carriers.</p>

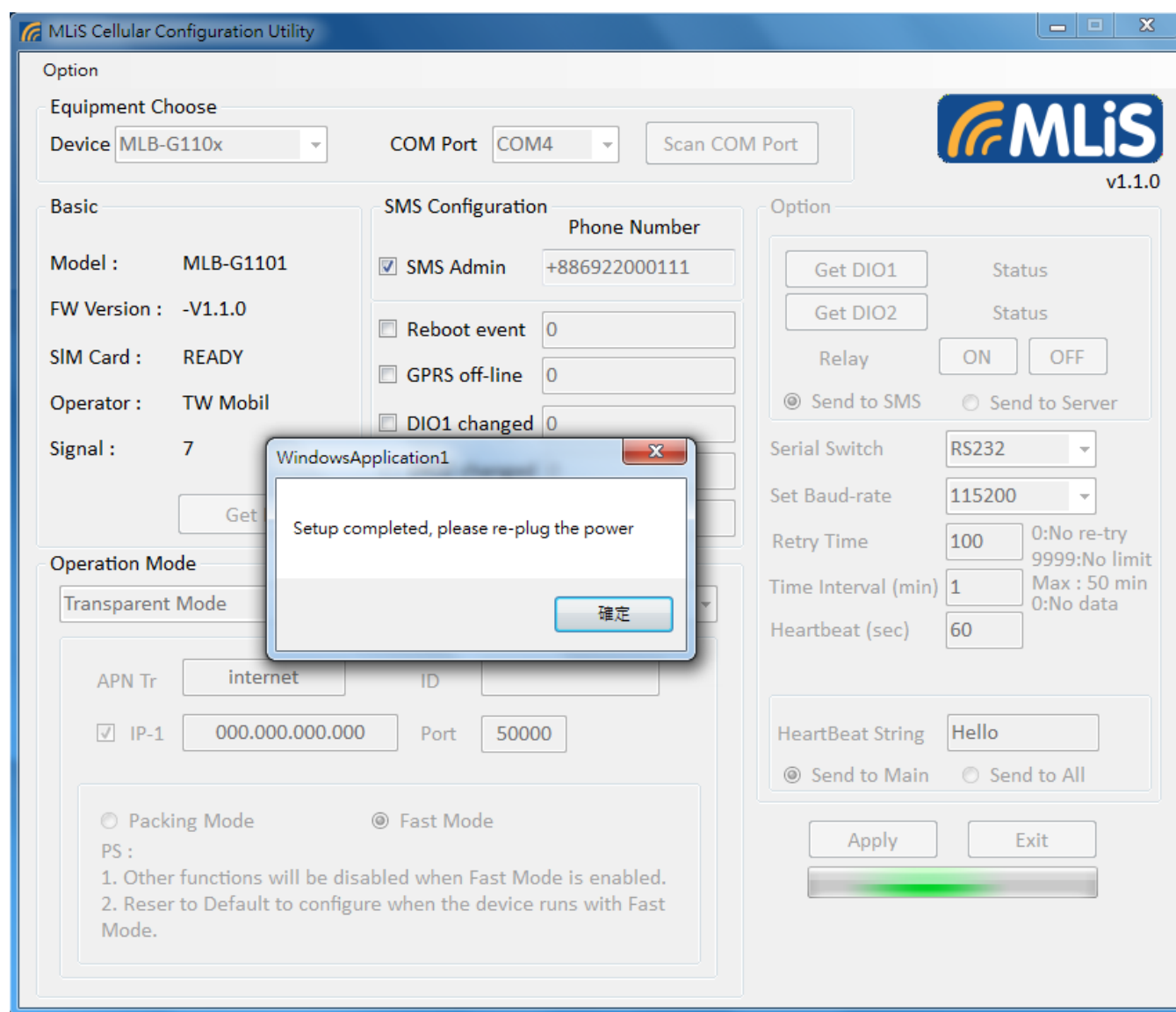
	<p>ID: Set ID.(It supports up to 15 characters)</p> <p>IP-1~IP-3: Multiple IP to transfer.</p> <p><b>Notice:</b> When the multiple IP function is enabled with large data transmission, the transmission performance will be affected.</p>
SMS Mode	<div> <div>Operation mode</div> <div>SMS Mode</div> <div> <div>Mobile</div> <div>0935000000</div> <div>Send Box</div> <div>Send</div> </div> </div> <p>Mobile: Set the mobile number user receives SMS.</p> <p>Send Box: Input SMS text.</p>
AT Command	<div> <div>Operation mode</div> <div>AT Command</div> <div> <div>Switch to AT Command</div> <div> <p>Explain :</p> <p>Press button will CHANGE mode to AT command.</p> <p>Close utility then open a Hyperterminal to use.</p> </div> </div> </div> <p>Click to switch to AT command mode.</p>

**Modes:**

	TCP/UDP	Transparent	Transparent
	Client Mode	Packing Mode	Fast Mode
Connection	5	1	1
Speed (Base on baud-rate 115200)	2~5M	7M	10M
Functions	Fully Support	Fully Support	Transmission Only
Packing	TCP packing	Stream	Stream

**Notice:** In common, we suggest user to use TCP/UDP mode.

**Step 4:** Click Apply to save settings to G1101.



- When applying the setting, make sure the RS232 cable is well connected.
- If the cable is loose during the applying, please long press the “Reset” button to reset G1101 to default. Then apply the setting again.

**Step 5 :** Settings are saved and re-plug the power.

[Note]: This is a real operation for reference. The user may input different parameters accordingly

- If G1101 is not running with 115200 baud-rate and user want to re-configure it, please double click the reset button to enter configuration mode (115200, N81). (Refer 3.2 Table5)

---

## **4 OPERATING NOTE**

### **4.1 Power on the Modem**

After plugin the power adapter, the modem is usually fully operational within 4 seconds, after powering it up. Depending on the signal strength of the network in the area, logging into a network may take longer and is outside the control of the modem.

### **4.2 Reset to default**

Press reset button, it will be reset to default. All of temporary data buffer will be clear.

### **4.3 External input x2**

External signal input source, positive signal are DI1 and DI2, negative signal are COM\_1 are COM\_2. Power input range is +12V~+48V, it will be determined as positive. It can be used for alert.

### **4.4 External Relay x1**

Non positive and negative signal relay output, maximum power input voltage range is +48V. It can be used for beeper.

### **4.5 DB9 Connector**

The RS-232/422/485 connector is DB9 male type, please refer to table 4

### **4.6 Install SIM card**

Please turn to back view, screw open the cover, then user will see SIM card holder. Please use SIM card faces to PCB board and put it into holder, please screw the cover back. (Please refer to Figure 6)

## **SALES CONTACT**

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## **5 ORDERING INFORMATION**

### **MLiS Product**

**MLB-G1101:** The MLIS Dual-Band 2G/3G wireless terminal

### **Power Adaptor**

**MLA-PSP-100:** Input: AC 100 ~ 240V Output: 9V/1.3A DC jack 5.5/2.1

**MLA-PSP-101:** US Adapter Plug

**MLA-PSP-104:** British Adapter Plug

**MLA-PSP-103:** European Adapter Plug

**MLA-PSP-102:** Australia Adapter Plug

**MLA-CAB-001:** DC Jack power line 5.5/2.1

### **Cable**

**MLA-CAB-101:** DB9 connector for RS232 (Female)

### **Antenna**

**MLA-ANT-002:** Magnet standalone antenna

**MLA-ANT-001:** PCB antenna

**MLA-ANT-005:** Magnet 850/900MHz-1800/1900MHz -2100MHz

5- band antenna with male SMA connector 1.5dBi



## This image shows a full page of white paper with horizontal dashed lines, typical of primary-ruled notebook paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

